

# Thematic Review of Some Studies About the Global Warming in Turkey

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## **Abstract**

The aim of this study is to analyze some studies conducted in Turkey on global warming, and to present these studies in an integrity. Document analysis method was used in the study. 20 scientific studies conducted between the years 2010-2018 have been thematically analyzed in terms of five elements (publication type of studies and distribution by years, objectives, methods, results, suggestions). The findings showed that the most publications were conducted in 2010 and 2013, the studies focused on secondary school students and teacher candidates. It was determined that scanning and special case study were the most preferred research methods, the data were mostly collected through semi-structured interview or survey, frequency/percentage/content analysis was mostly used as data analysis. In addition, it was determined that the students/teacher candidates acquired information about the subject from the media and did not have enough knowledge about global warming. In the studies, it has been suggested that information should be given mostly through the media, and that global warming should be given more place in the curriculum and textbooks. Based on the findings, some suggestions were made for future research on global warming.

**Keywords:** Global warming, education, student opinions, thematic review .

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## **Introduction**

Along with the industrial revolution that began in the 18th century, human relations with the environment have also changed radically. With the increase in industrialization-urbanization ratio and world population, environmental problems causing environmental pollution have also increased (Akın, 2006; Arsal, 2012; Muşmul & Yaman, 2018). Global warming is one of the most important environmental problems of the 21st century (Erdoğan-Sağlam, Düzgüneş & Balık, 2008; Arsal, 2012; Yazdanparast, Salehpour & Masjedi, 2013; Sah & Bellad, 2015). This problem threatens not only people but also all livings. It should not be forgotten that each individual is responsible for preventing the global warming problem that affects not only a certain region or country, but also the whole world. In order to find a solution to the global warming problem, individuals must first become aware of the problem and need to be informed about this issue (Yazdanparast et al., 2013; Sah & Bellad, 2015). The best way to raise awareness is to educate them. From kindergarten to university at all educational levels, students' thoughts, knowledge levels, alternative concepts about global warming should be determined, and appropriate learning environments should be prepared.

At different levels of education in Turkey, a number of studies were conducted on students' thoughts and knowledge levels about global warming (Bozdoğan & Yanar, 2010; Ersoy & Türkan, 2010; Öncül, 2010; Özdemir, 2010; Seçgin, Yalvaç & Çetin, 2010; Yalçın, 2010; Yardımcı & Bağcı-Kılıç, 2010; Aksan, 2011; Sadık, Çakan & Artut, 2011; Erdoğan & Cerrah-Özsevgeç, 2012; Tanrıverdi, 2012; Ateş & Karatepe, 2013; Kaya, 2013; Sever, 2013; Ulutaş, 2013; Aydın, 2014; Emli, 2014; Al, 2015; Eroğlu & Aydoğdu, 2016; Gedik, 2018; Terzi, 2018). In the studies, different results have been found that reveal the students' perceptions of global warming. The access of teachers and researchers to all relevant studies will create difficulties in terms of time. Therefore,

it is considered that it would be beneficial and effective to collect and present all the studies related to the subject in one study. Therefore, domestic-sourced studies on global warming need to be thematically analyzed with a matrix. The aim of this study is to analyze some studies conducted in Turkey on global warming, and to present these studies in an integrity. It is also aimed to identify common or different points in the studies and to guide the future researches. All studies conducted between the years 2010-2018 were examined comparatively. In this context, the following questions were asked:

1. What is the publication type of the studies on global warming and how is the distribution of these studies by years?
2. What are the purposes of the studies?
3. What are the research methods (study group, data collection tools and analysis methods) used in the studies?
4. What are the main results of the studies?
5. What recommendations have been made in the studies?

#### *Importance of the Study*

The analysis of some studies conducted in education about global warming provides information about what the researchers are focusing on, and provides detailed and developmental information on the subject from the past to the present. It can be difficult for both teachers and researchers to investigate one by one the studies conducted on global warming in the literature. Collecting and analyzing the current studies in a single source, facilitates examination of these studies. In this study, the views of students/teacher candidates on the subject, common points in these views and alternative concepts have been determined. Therefore, it can be said that the study will be important and useful for teachers/academicians/program development experts.

As a result of the literature review, it has been observed that the studies conducted on global warming until 2010 were examined in terms of different categories. Bozdoğan (2011) has analyzed 62 articles which were published about global warming between 1992-2009 in the world and Turkey. Articles were examined in terms of “goals, results and teaching levels”. Ünlü, Sever & Akpınar (2011) have analyzed 30 studies (articles and presentations) which were published about global warming and greenhouse effect between 2000-2010 in Turkey. The studies were examined in terms of “misconceptions, perception, academic knowledge level, program reviews and method-techniques”. There has been no analysis of the studies on global warming since 2010. In this research, conducted studies about global warming between the years of 2010-2018 in Turkey, are examined thematically and a holistic perspective is provided. In this respect, the study is expected to guide future research.

#### *Restriction of the Study*

Because of global warming is a universal problem, many studies have been carried out both in the country and abroad. In this research, conducted studies about global warming in the field of education between the years of 2010-2018 in Turkey, are investigated. Studies in the national database were scanned using the keyword “global warming”. When the studies are examined, it is determined that 20 of the studies are about the views and knowledge level of students/teacher candidates on global warming, and were conducted between 2010-2018. In addition, 15 of these studies were directly related to the issue of global warming, while five were involved in environmental problems.

#### **Methodology**

In this study, one of the qualitative research methods, document analysis method is used. Document analysis is a systematic method for analyzing and evaluating printed

and electronic materials according to predetermined criteria (Yıldırım & Şimşek, 2005; Bowen, 2009). Studies investigating the views of the students/teacher candidates on global warming have been examined in a systematic way. The matrix used in different studies (Çalık, Ayas & Ebenezer, 2005; Kurnaz & Çalık, 2009; Kurnaz & Sağlam-Arslan, 2011; Ezberci-Çevik & Kurnaz, 2016; Kurnaz, Bozdemir, Altunoğlu & Ezberci-Çevik, 2016; Aktaş & Kurnaz, 2018), was adapted to this study. The matrix contains five elements within the framework of the research questions; (1) publication type of the studies and distribution by years, (2) the purpose of the study, (3) research method, (4) main results, (5) recommendations. All studies have been analyzed and classified according to five factors. In this way, common aspects, differences and general thoughts in studies were revealed.

## Findings

Under this heading, findings obtained within the framework of research questions are given.

### *Publication Type of the Studies and Distribution by Years*

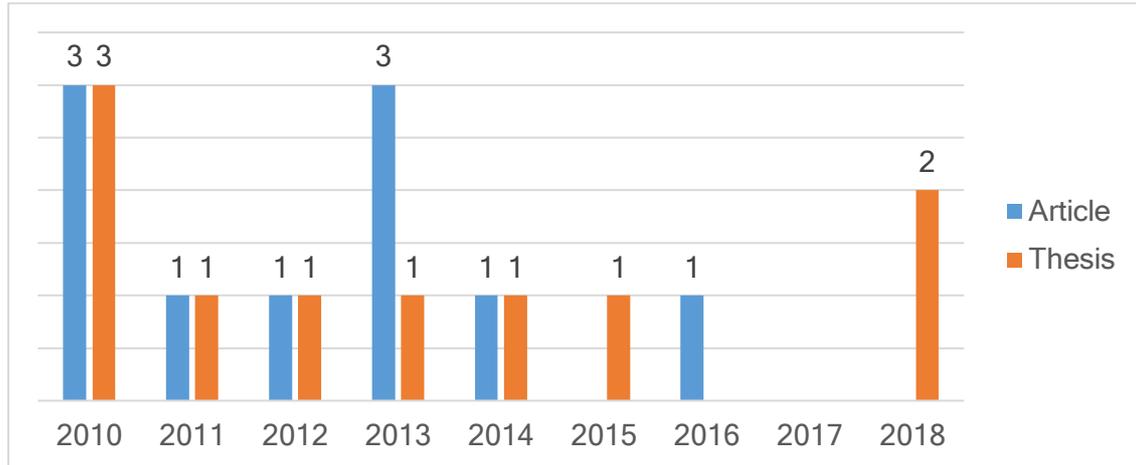
The distribution of the studies on global warming in the type of publication (article, thesis) is given in chronological order in Table 1.

Tablo 1.

### *Publication type of the studies*

<i>Studies (chronologically)</i>	<i>National Article</i>	<i>Master Thesis</i>
Bozdoğan & Yanar, 2010	✓	
Ersoy & Türkkın, 2010	✓	
Öncül, 2010		✓
Özdemir, 2010		✓
Yalçın, 2010		✓
Yardımcı & Bağcı-Kılıç, 2010	✓	
Aksan, 2011		✓
Sadık et al., 2011	✓	
Erdoğan & Cerrah-Özsevgeç, 2012	✓	
Tannıverdi, 2012		✓
Ateş & Karatepe, 2013	✓	
Kaya, 2013	✓	
Sever, 2013	✓	
Ulutaş, 2013		✓
Aydın, 2014	✓	
Emlı, 2014		✓
Al, 2015		✓
Eroğlu & Aydoğdu, 2016	✓	
Gedik, 2018		✓
Terzi, 2018		✓

When Table 1 is examined, it is seen that 10 studies are national articles and 10 studies are master thesis. Between 2010 and 2018, the number of studies published in the national article type is equal to the number of master's thesis studies (50%). It is noteworthy that there is no doctoral thesis that investigates students' views or levels of knowledge about global warming. The distribution by years of the publication types of the studies examined is shown in Graph 1.



Graph 1. The distribution by years of the publication types of the studies examined

When the graph 1 is analyzed, it is seen that the highest number of studies were done in 2010 and 2013, and the number of studies in other years was less. It is noteworthy that no studies were conducted on the subject in 2017.

#### *Purposes of the Studies*

The objectives of the studies on global warming are given in chronological order in Table 2.

Table 2.

#### *Purposes of the studies*

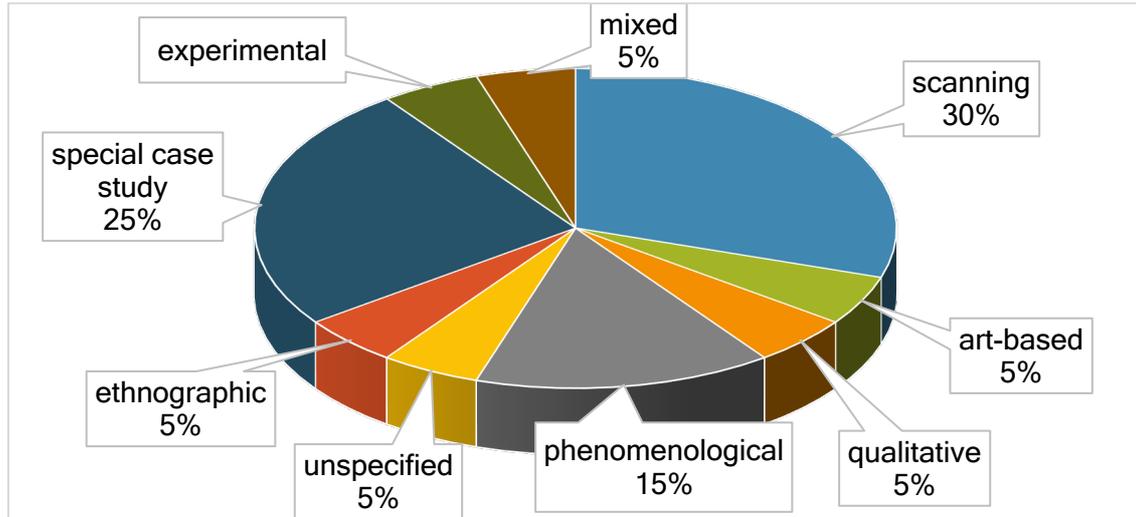
<i>Studies (chronologically)</i>	<i>Purpose(s)</i>
Bozdoğan & Yanar, 2010	The aim of this study is to reveal the opinions of prospective teachers about the future effects of global warming.
Ersoy & Türkkan, 2010	The aim of this research is to reveal the emotions, thoughts and suggestions of the elementary students about the problems they face in their environment through the cartoons they draw.
Öncül, 2010	It is aimed to determine the perceptions of 7th grade students on local environmental problems and their perceptions about global warming and climate change.
Özdemir, 2010	To determine prospective teachers' views on global warming.
Yalçın, 2010	In this study, it is aimed to determine the level of knowledge and misunderstandings of primary school students about global warming and greenhouse effect.
Yardımcı & Bağcı-Kılıç, 2010	It is aimed to investigate the information that students have about environment and environmental problems.
Aksan, 2011	To determine the perceptions of teacher candidates on global warming.
Sadık et al., 2011	The aim of this study is to investigate the perceptions about environmental problems of children living in different socio-economic levels.
Erdoğan & Cerrah-Özseveç, 2012	This research was carried out to investigate the effect of concept cartoons on elimination of students' misconceptions about greenhouse effect and global warming.

Tanrıverdi, 2012	To reveal the students' knowledge and attitudes towards the environment.
Ateş & Karatepe, 2013	To determine the perceptions of university students about the concept of global warming with the help of metaphors.
Kaya, 2013	It is aimed to show how social studies teacher candidates perceive global warming.
Sever, 2013	This research is aimed to determine the level of awareness and knowledge of science teacher candidates about global warming in Turkey and the UK.
Ulutaş, 2013	To examine the knowledge levels of students about global warming.
Aydın, 2014	To determine the level of knowledge and misunderstandings of secondary school students about global warming.
Emlî, 2014	The aim of this study is to investigate the mental models of 7th grade students about global warming.
Al, 2015	To examine the perceptions of prospective teachers on global warming.
Eroğlu & Aydoğdu, 2016	It is aimed to determine the knowledge levels of prospective teachers about global warming.
Gedik, 2018	This research was carried out to determine the opinions of 8th grade students about the global warming as a socio-scientific topic in the Social Studies Course.
Terzi, 2018	In this study, it is aimed to reveal the perspectives of prospective teachers about global warming by using one of the new approaches in education.

When Table 2 is examined, it is understood that some studies focus on students' perceptions of global warming (Bozdoğan & Yanar, 2010; Ersoy & Türkkkan, 2010; Öncül, 2010; Özdemir, 2010; Aksan, 2011; Sadık et al., 2011; Ateş & Karatepe, 2013; Kaya, 2013; Emlî, 2014; Al, 2015; Gedik, 2018; Terzi, 2018), while some studies focus on students' knowledge and alternative concepts about global warming (Yalçın, 2010; Yardımcı & Bağcı-Kılıç, 2010; Erdoğan & Cerrah-Özsevgeç, 2012; Tanrıverdi, 2012; Sever, 2013; Ulutaş, 2013; Aydın, 2014; Eroğlu & Aydoğdu, 2016). It was seen that two of the studies (Yalçın 2010; Erdoğan & Cerrah-Özsevgeç, 2012) included the issue of greenhouse effect with global warming. In addition, it was seen that 13 of the studies only included the issue of global warming, while five of them included global warming within environmental problems (Ersoy & Türkkkan, 2010; Öncül, 2010; Yardımcı & Bağcı-Kılıç, 2010; Sadık et al., 2011; Tanrıverdi, 2012)

#### *Methodologies of the Studies*

The distributions of the research methodologies used in the studies are presented in Graph 2.



Graph 2. The distributions of the research methodologies used in the studies

According to Graph 2, the research methods used in the studies show diversity. It is noteworthy that scanning ( $n=6$ ) and special case study ( $n=5$ ) research methods are the most used. In addition, it has been determined that experimental ( $n=1$ ), mixed ( $n=1$ ), art based ( $n=1$ ), qualitative ( $n=1$ ), phenomenological ( $n=3$ ) and ethnographic ( $n=1$ ) research methods are used. While quantitative research methods ( $n=7$ ) are preferred in some studies, qualitative research methods ( $n=11$ ) have been preferred in most studies. While mixed method was used one of the studies, one of them did not specify the research method. The distribution of the studies according to the study groups is given in Table 3.

Tablo 3.

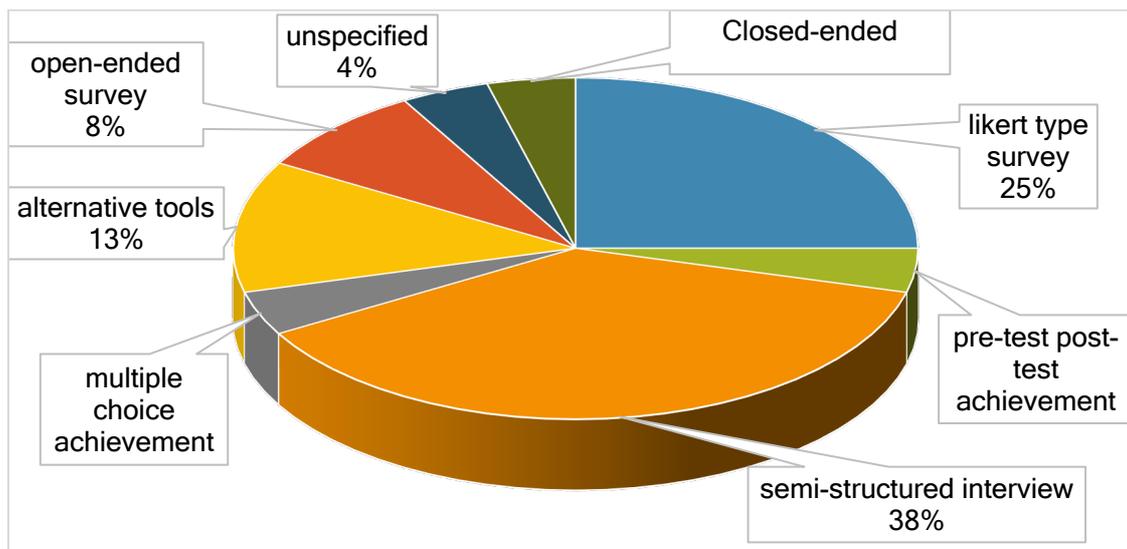
*The distribution of the studies according to the study groups*

<i>Studies (chronologically)</i>	<i>Study Groups</i>			<i>N</i>
	<i>Primary/Secondary school</i>	<i>High school</i>	<i>Prospective teachers</i>	
Bozdoğan & Yanar, 2010			Primary	68
Ersoy & Türkkan, 2010	4th grade			30
Öncül, 2010	7th grade			60
Özdemir, 2010			Biology and science	80
Yalçın, 2010	4th, 5th, 6th, 7th ve 8th grade			200
Yardımcı & Bağcı-Kılıç, 2010	8th grade			11
Aksan, 2011			Mathematics, science, classroom, preschool and social studies	395
Sadık et al., 2011	5th grade			206
Erdoğan & Cerrah-Özsevgeç, 2012	7th grade			17

Tanrıverdi, 2012		10th grade		242
Ateş & Karatepe, 2013			Physics, chemistry, biology	250
Kaya, 2013			Social studies	115
Sever, 2013			Science	14
Ulutaş, 2013	6th, 7th ve 8th grade			960
Aydın, 2014		9th, 10th, 11th ve 12th grade		592
Emlı, 2014	7th grade			185
Al, 2015			Science	18
Erođlu & Aydođdu, 2016			Science	271
Gedik, 2018	8th grade			613
Terzi, 2018			Primary	35

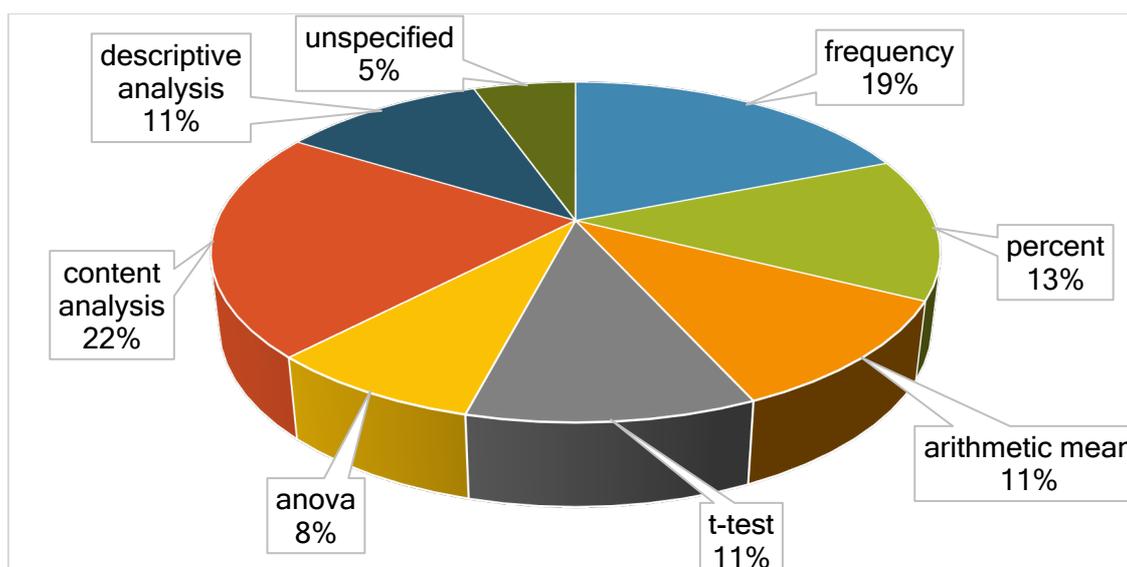
According to Table 3, nine studies are conducted with primary/secondary school students, two studies with high school students and nine studies with prospective teachers. Studies on global warming focus on secondary school students and prospective teachers. It is noteworthy that few studies were conducted with primary and high school students.

Two of the studies (Ersoy & Türkkın, 2010; Gedik, 2018) at primary/secondary/ high school level were based on social studies lesson. One study (Erdođan & Cerrah-Özsevgeç, 2012) was based on science lesson and one study (Aydın, 2014) was based on geography lesson. It is not stated in which lesson the seven studies are conducted. The studies conducted with prospective teachers show diversity according to the department. Two studies (Bozdođan & Yanar, 2010; Terzi, 2018) were conducted with primary prospective teachers, three studies (Sever, 2013; Al, 2015; Erođlu & Aydođdu, 2016) were conducted with science prospective teachers, and one study (Kaya, 2013) was conducted with social studies prospective teachers. Prospective teachers in different programs of the faculty of education participated two studies (Özdemir, 2010; Aksan, 2011). The data collection tools used in the studies are given in Graph 3.



Graph 3. Data collection tools used in the studies

According to Graph 3, the data collection tools used in the studies show diversity. Questionnaire (open-ended and likert), achievement test (multiple-choice, pre-test post-test, closed-ended), interview (semi-structured) and alternative tools (cartoon, picture, story) are preferred as data collection tools. Semi-structured interview and questionnaire were more preferred. In general, only one data collection tool was used in 15 studies (Bozdoğan & Yanar, 2010; Öncül, 2010; Özdemir, 2010; Yalçın, 2010; Yardımcı & Bağcı-Kılıç, 2010; Sadık et al., 2011; Tanrıverdi, 2012; Kaya, 2013; Sever, 2013; Ulutaş, 2013; Aydın, 2014; Emli, 2014; Al, 2015; Eroğlu & Aydoğdu, 2016; Terzi, 2018), and more than one data collection tool was used in four studies (Ersoy & Türkan, 2010; Aksan, 2011; Erdoğan & Cerrah-Özsevgeç, 2012; Gedik, 2018). In one study (Ateş & Karatepe, 2013), the data collection tool used was not specified. The data analysis methods used in the studies are given in Graph 4.



Graph 4. Data analysis methods used in the studies

According to Graph 4, frequency/percentage among the quantitative analysis methods and content analysis among the qualitative analysis methods were more preferred. In six studies (Bozdoğan & Yanar, 2010; Özdemir, 2010; Yalçın, 2010; Erdoğan & Cerrah-Özsevgeç, 2012; Ulutaş, 2013; Aydın, 2014), quantitative analysis methods such as frequency/percentage/arithmetic mean/t-test/anova were used. As a qualitative analysis method, content analysis in seven studies (Yardımcı & Bağcı-Kılıç, 2010; Sadık et al., 2011; Ateş & Karatepe, 2013; Kaya, 2013; Emli, 2014; Al, 2015; Terzi, 2018) and descriptive analysis in three studies (Ersoy & Türkkan, 2010; Aksan, 2011; Sever, 2013) were preferred. In two studies (Öncül, 2010; Gedik, 2018), quantitative and qualitative analysis methods were used together, whereas in two (Tanrıverdi, 2012; Eroğlu & Aydoğdu, 2016), the analysis method was not specified.

#### *The Main Results of the Studies*

The studies are examined in terms of students' thoughts and knowledge about global warming. The main results of the studies are given in Table 4. Studies including similar results are presented together.

Tablo 4.

#### *The main results of the studies*

<b><i>Studies</i></b>	<b><i>Main Results</i></b>
Bozdoğan & Yanar, 2010; Özdemir, 2010; Aksan, 2011; Erdoğan & Cerrah-Özsevgeç, 2012; Tanrıverdi, 2012; Ulutaş, 2013; Emli, 2014	The majority of participants have a false view that thinning/perforation in the ozone layer will cause global warming.
Bozdoğan & Yanar, 2010; Ulutaş, 2013; Eroğlu & Aydoğdu, 2016; Gedik, 2018	Participants' level of knowledge change/do not change according to gender.
Özdemir, 2010; Ateş & Karatepe, 2013; Aydın, 2014	The majority of participants have sufficient knowledge of global warming.
Yalçın, 2010; Ulutaş, 2013; Aydın, 2014; Gedik, 2018	The knowledge level of participants changes according to the grade level/school type/school location. As the grade level increased, the participants had more accurate information.
Yalçın, 2010; Aksan, 2011; Erdoğan & Özsevgeç, 2012; Ulutaş, 2013; Aydın, 2014; Emli, 2014	Most of the participants establish/do not establish a correct relationship between global warming and greenhouse effect.
Ersoy & Türkkan, 2010; Öncül, 2010; Aksan, 2011; Ateş & Karatepe, 2013; Sever, 2013; Emli, 2014; Gedik, 2018	Participants obtained most of the information about global warming from the media (TV, internet, newspaper) and school (teachers).
Ersoy & Türkkan, 2010; Öncül, 2010; Aksan, 2011; Ateş & Karatepe, 2013; Ulutaş, 2013; Al, 2015; Eroğlu & Aydoğdu, 2016; Terzi, 2018	Global warming is the result of people's insensitivity. People need to be sensitive and take responsibility for solving this problem.
Öncül, 2010	Textbooks contain limited information on global warming.

Öncül, 2010; Yardımcı & Bağcı-Kılıç, 2010; Aksan, 2011; Sadık et al., 2011; Erdoğan & Cerrah-Özsevgeç, 2012; Tanrıverdi, 2012; Kaya, 2013; Sever, 2013; Ulutaş, 2013; Emli, 2014; Eroğlu & Aydoğdu, 2016; Terzi, 2018	Participants have incomplete/superficial informations and alternative concepts about the causes/effects of global warming and measures to be taken.
Öncül, 2010; Yalçın, 2010; Ateş & Karatepe, 2013; Sever, 2013	Global warming is seen as a great threat to people; because it is not a regional problem, it is a problem that concerns all humanity.
Yalçın, 2010; Ateş & Karatepe, 2013; Emli, 2014	Participants agree that global warming will have a negative impact on people and the world.
Sadık et al., 2011	The ways in which students express global warming vary according to the socio-economic level. As socio-economic level increases, students' expressing environmental problems are enriched.
Erdoğan & Cerrah-Özsevgeç, 2012	The use of concept cartoons has positively influenced students' knowledge of global warming and reduced their alternative concepts.
Tanrıverdi, 2012; Kaya, 2013	The conceptual structures of the participants are based on the effects of this phenomenon rather than the causes and sources of global warming.
Al, 2015	Prospective teachers' views on global warming are resistant to change.

When Table 4 is examined, it is seen that participants in different age groups (primary/secondary/high school students and prospective teachers) do not have enough knowledge about global warming in general. In most of the studies, it was determined that participants mixed the causes and consequences of global warming and they had alternative concepts (Öncül, 2010; Yardımcı & Bağcı-Kılıç, 2010; Aksan, 2011; Sadık et al., 2011; Erdoğan & Cerrah-Özsevgeç, 2012; Tanrıverdi, 2012; Kaya, 2013; Sever, 2013; Ulutaş, 2013; Emli, 2014; Eroğlu & Aydoğdu, 2016; Terzi, 2018). In particular, the finding that thinning in the ozone layer leads to global warming has been involved in many studies (Bozdoğan & Yanar, 2010; Özdemir, 2010; Aksan, 2011; Erdoğan & Cerrah-Özsevgeç, 2012; Tanrıverdi, 2012; Ulutaş, 2013; Emli, 2014). It was determined that the participants have established relation between greenhouse gases and global warming in some studies (Yalçın, 2010; Aksan, 2011; Aydın, 2014) and they have not establish in some studies (Erdoğan & Cerrah-Özsevgeç, 2012; Ulutaş, 2013; Emli, 2014). Participants agree that the main reason for global warming is the human factor (Ersoy & Türkkkan, 2010; Öncül, 2010; Aksan, 2011; Ateş & Karatepe, 2013; Ulutaş, 2013; Al, 2015; Eroğlu & Aydoğdu, 2016; Terzi, 2018). Another common point that draws attention in the results of the studies is that the participants get their knowledge about global warming from the media and the school (Ersoy & Türkkkan, 2010; Öncül, 2010; Aksan, 2011; Ateş & Karatepe, 2013; Sever, 2013; Emli, 2014; Gedik, 2018). In this case, a teacher who has insufficient knowledge of the subject or has alternative concepts may mislead his/her students. If news sources transfer missing or inaccurate information about global warming, false learnings may occur in students.

In some studies, participants' information about the global warming was discussed in terms of various variables. In some studies, it was observed that the knowledge level of the participants changed/did not change according to gender (Bozdoğan & Yanar, 2010; Ulutaş, 2013; Eroğlu & Aydoğdu, 2016; Gedik, 2018). In some of them, it was concluded

that the level of knowledge of the participants changed according to the grade level/school type/school location/socio-economic level (Yalçın, 2010; Sadık et al., 2011; Ulutaş, 2013; Aydın, 2014; Gedik, 2018). In only one study (Erdoğan & Cerrah-Özsevgeç, 2012), it was found that the global warming is taught using concept cartoons and the teaching made had a positive effect on students' knowledge about global warming.

### *Recommendations of the Studies*

Some important recommendations made by the researcher(s) are given in Table 5. Studies including similar recommendations are presented together.

Tablo 5.

### *Recommendations of the studies*

<i>Studies</i>	<i>Recommendations</i>
Bozdoğan & Yanar, 2010; Yalçın, 2010; Sadık et al., 2011; Tanrıverdi, 2012; Aydın, 2014; Terzi, 2018	Visual materials (documentaries, photographs, power point presentations, etc.) should be used in teaching global warming.
Bozdoğan & Yanar, 2010; Sadık et al., 2011 Ersoy & Türkkkan, 2010	Participation of students/prospective teachers in various social activities/projects should be ensured. Teachers can ask their students to draw cartoons on the subject. Thus, they can determine their students' thoughts and misconceptions about the subject. In the following process, they can organize activities that will eliminate misinformation.
Öncül, 2010; Yalçın, 2010; Tanrıverdi, 2012; Kaya, 2013; Aydın, 2014; Emli, 2014; Eroğlu & Aydoğdu, 2016	In curriculums and textbooks, global warming should take place more.
Öncül, 2010; Özdemir, 2010; Yalçın, 2010; Yardımcı & Bağcı-Kılıç, 2010; Aksan, 2011; Tanrıverdi, 2012; Ulutaş, 2013; Emli, 2014; Eroğlu & Aydoğdu, 2016; Gedik, 2018; Terzi, 2018	In order to inform people about global warming, media tools should be more utilized and correct/necessary publications should be arranged.
Özdemir, 2010; Ulutaş, 2013; Aydın, 2014	Beginning from pre-school period, environmental education should be included in the program of each lesson and at each grade level. This training should be given by both formal and non-formal education institutions.
Özdemir, 2010; Yalçın, 2010; Aksan, 2011; Erdoğan & Cerrah-Özsevgeç, 2012; Tanrıverdi, 2012; Al, 2015 Sadık et al., 2011	For effective environmental education, firstly students' prior knowledge and alternative concepts should be determined and appropriate instructional strategies should be developed and applied. The teacher should take into account the socio-economic differences when teaching environmental issues.
Sever, 2013	It is recommended that teacher education programs should be enriched in terms of environmental education. It is also recommended that teachers in service should be trained in a similar way.

Ulutaş, 2013	A special program on environmental education should be prepared and taught as a separate course.
Aydın, 2014	In teaching the subject of global warming, instructional practices should be made considering the constructivist approach.
Emlı, 2014	In the same learning environment, educational planning should be made considering the students who have different mental models.

When Table 5 is examined, it is seen that common suggestions have been made in some studies. It is noteworthy that some suggestions take place in many studies. First, it is suggested to make more use of media tools in order to provide accurate and necessary information about global warming (Öncül, 2010; Özdemir, 2010; Yalçın, 2010; Yardımcı & Bağcı-Kılıç, 2010; Aksan, 2011; Tanrıverdi, 2012; Ulutaş, 2013; Emlı, 2014; Eroğlu & Aydoğdu, 2016; Gedik, 2018; Terzi, 2018). Second, it is emphasized that global warming should be more involved in curriculums and textbooks (Öncül, 2010; Yalçın, 2010; Tanrıverdi, 2012; Kaya, 2013; Aydın, 2014; Emlı, 2014; Eroğlu & Aydoğdu, 2016). Third, it is recommended that visual materials should be used in teaching global warming (Bozdoğan & Yanar, 2010; Yalçın, 2010; Sadık et al., 2011; Tanrıverdi, 2012; Aydın, 2014; Terzi, 2018). Fourth, it is suggested to determine the prior knowledge and alternative concepts of the students about the subject, to develop and implement of appropriate teaching strategies (Özdemir, 2010; Yalçın, 2010; Aksan, 2011; Erdoğan & Cerrah-Özsevgeç, 2012; Tanrıverdi, 2012; Al, 2015).

## Results and Discussion

In this research, the studies which conducted in Turkey between the years 2010-2018 and investigated the participants' thoughts and level of knowledge about global warming, were examined in terms of various variables (types of publications and distribution by years, objectives, methods, results and recommendations). It is determined that the articles and master's thesis studies are equal in number and that the doctoral thesis is not done about the subject. It was seen that the highest number of studies were conducted in 2010 and 2013, and no studies were conducted in 2017.

It was determined that 13 of the studies only included the issue of global warming, while five of them included global warming within environmental problems, two of the studies included the issue of greenhouse effect with global warming. It is noteworthy that the research methods used in the studies show diversity and, scanning (n=6) and special case study (n=5) methods are the most used, and qualitative research methods (n = 11) have been preferred in most studies. It was observed that studies on the subject focus on secondary school students and prospective teachers, and few studies have been conducted with primary and high school students. As a data collection tool, semi-structured interview and questionnaire was preferred the most. Frequency/percentage among the quantitative analysis methods and content analysis among the qualitative analysis methods were more preferred.

In most of the studies, it is emphasized that the participants do not have enough knowledge about global warming, they mixed the causes and consequences of global warming and they had alternative concepts, they get their knowledge about global warming mostly from the media and the school. These results are in line with the studies of Bozdoğan (2011) and Ünlü et al. (2011). Bozdoğan's (2011) study covers the years 1992-2009, the study conducted by Ünlü et al. (2011) covers the period 2000-2010. The current study includes the studies between 2010-2018. This situation shows that

students'/ prospective teachers' missing and incorrect learning about the global warming from the past to the present continues. This result should not be surprising, given the fact that prospective teachers who do not have sufficient scientific knowledge, will transfer their opinions to their students when they become teachers. It is important to provide adequate and correct training for prospective teachers in terms of proper education of future generations.

Students' knowledge about the subject was also investigated in terms of various variables (gender, grade level, type of school, location of school, socio-economic level). In parallel with the findings, some suggestions were made in the studies. It is suggested to make more use of media tools in order to provide accurate and necessary information, to give more place to global warming in the curriculum and textbooks, to be used the visual materials in teaching the subject, to determine the prior knowledge and alternative concepts of the students and to teach accordingly.

### **Recommendations**

1. In this research, only the studies which conducted in Turkey and investigated the participants' thoughts and level of knowledge about global warming, were examined. Global warming is a universal problem that concerns the whole world, not just Turkey. Therefore, the studies conducted in abroad on the subject can be examined and the opinions and knowledge levels of students in different countries can be examined. Thus, cross-cultural comparisons can be made.
2. It has been observed that the studies on the subject focus on secondary and university levels and there is not enough study at primary and high school level. Beginning from the pre-school period, it is very important to work on students at all levels of education. Deficiencies in the literature can be eliminated especially with the studies to be done at primary and high school level.
3. It was seen that the number of studies using the qualitative and quantitative data collection tools together was low, the data were collected with a single data collection tool in most of the studies. More in-depth research can be done using multiple data collection tools.
4. There is no study investigating students' conceptual understanding of global warming. A two- or three-stage conceptual understanding test can be developed and students' conceptual understandings can explore.
5. Global warming is an interdisciplinary subject which should be included in every level of education and in every lesson. In this context, a detailed study on curricula can be made to determine which grade level and which lessons contain the issue of global warming.
6. Teachers who are the implementers of curricula have great responsibility in this regard. Therefore, studies on teachers can be examined.
7. In only one study, the effect of teaching through concept cartoons on the knowledge level of students was investigated. The effect of different teaching strategies can be investigated. With the experimental studies to be done, the gap in the literature can be eliminated.

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# Türkiye’de Küresel Isınmayla İlgili Yapılan Bazı Çalışmaların Tematik İncelenmesi

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## Özet

Bu çalışmanın amacı, küresel ısınmayla ilgili Türkiye’de yapılan bazı çalışmalarını analiz etmek ve bir bütünlük içinde sunmaktır. Çalışmada, doküman analizi yöntemi kullanılmıştır. 2010-2018 yılları arasında yapılan 20 bilimsel çalışma, beş unsur açısından (çalışmaların yayın türü ve yıllara göre dağılımı, amaçları, yöntemleri, sonuçları, önerileri) tematik analizden geçirilmiştir. Analizler sonucunda, en fazla yayının 2010 ile 2013 yıllarında yapıldığı, çalışmaların ortaokul öğrencileri ve öğretmen adayları üzerinde yoğunlaştığı görülmüştür. Araştırma yöntemi olarak en çok tarama ve özel durum çalışmasının tercih edildiği, verilerin çoğunlukla yarı-yapılandırılmış görüşme ya da anket yoluyla toplandığı, veri analizinde en fazla frekans/yüzde/içerik analizine başvurulduğu belirlenmiştir. Ayrıca, çoğu çalışmada, öğrencilerin/öğretmen adaylarının konu hakkındaki bilgilerini en çok medyadan edindikleri ve küresel ısınma hakkında yeterli bilgiye sahip olmadıkları tespit edilmiştir. Çalışmalarda en çok medya yoluyla bilgilendirme yapılması, öğretim programlarında ve ders kitaplarında küresel ısınmaya daha çok yer verilmesi önerilmiştir. İncelenen çalışmaların sonuçlarından hareketle, küresel ısınma konusunda gelecekte yapılabilecek araştırmalar için bazı önerilerde bulunulmuştur.

**Anahtar Kelimeler:** Küresel ısınma, eğitim, öğrenci görüşleri, tematik inceleme.